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# Introduction

## **GOAL:**

1. To develop a community of researchers and educators in Simulation-based Learning (S-b-L);
  2. To explore fundamental issues and barriers to S-b-L, including integration into professional curriculum;
  3. To promote evaluation of S-b-L in clinically-related learning environments;
- 

## **ABSTRACT:**

A series of eight workshops about Simulation and Game-based Learning were conducted during a two-year period. Speakers from the game industry, academia, and e-learning organizations discussed a wide range of topics. The programs and the attendee evaluations are summarized in this report. URL's are provided for individual presentations.

## Body

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Figure 1. Representative images, from the first workshop, of the audience, a speaker, and a discussion panel.

### Project Rationale:

The geographic constraints of travel time and cost, and reduced population density with fewer academic institutions in the Western Regions of the U.S. significantly limits active participation by West Coast researchers and educators in TATRC's East Coast projects and activities focused on SBL in medical environments. Community-building activities in the Western Region are expected to develop a western region community, and to make such a community more visible to TATRC's headquarters, and to researchers around the country and the world. We proposed that we would organize and hold *quarterly workshops* in the area of *simulation and game-based learning*, with planning, publicity, recruitment of guest speakers and participants, post-workshop publication and evaluation. SUMMIT (Stanford University Medical Media and Information Technologies) was awarded a competitive contract from TATRC (Tele-medicine & Advanced Technology Research Center) to conduct a series of workshops on these topics.

### Workshops Held:

	Topic	Locale	# Attending	Date
1	WORKSHOP ON GAMING & SIMULATION-BASED LEARNING: Applications in Medicine; 1-day	Long Beach, CA – MMVR	118 people	1/25/05
2	MEDICAL-SURGICAL TRAINING WITH VIDEOGAMES; ½-day	Portland, OR –Slice of Life	19 people	6/14/05
3	DESIGNING COMPELLING MEDICAL GAMES; 3-days	Stanford, CA	47 people	10/6-8/05

4	CURRENT & FUTURE RESEARCH DIRECTION in GAME-BASED LEARNING; 1day	San Diego, CA	12 people	12/15/05
5	CREATING GAMES and SIMULATIONS for LEARNING; 1-day	Long Beach, CA –MMVR	78 people	1/23/06
6	DESIGNING CASE-BASED LEARNING for VIRTUAL WORLDS; 2-days	Stanford, CA	36people	8/24-5/06
7	PROTOTYPING SURGICAL SIMULATORS with OPEN-SOURCE SIMULATION SOFTWARE;3-d	Stanford, CA	49 people	8/28-30/06
8	ROADMAP for SIMULATION and GAME-BASED LEARNING RESEARCH; ½ day	Web-cast: Stanford, CA	61 people	10/13/06

### **Simworkshops Website (<http://simworkshops.stanford.edu/>):**

A project web site was created with separate web sites for each workshop. The following pages show the home page for the project, indicating the key functionality available. The world map indicates the global reach of the workshops.



# SimWorkshops



[Home](#) [About](#) [Workshops](#) [Readings](#) [Index](#)

## Spotlights



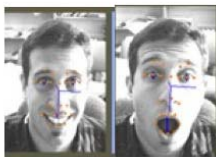
*If you want to build a game for learning, you better play a lot of games ...Read Ben Sawyer's recommended list of game websites!*



*A 'serious game':*

- has a challenging goal
- is fun to play or engaging
- incorporates some form of scoring
- imparts to the user a skill, knowledge or attitude that can be applied in the real world

Listen to [Bryan Bergeron](#) and others discuss serious games.



*Imagine a class where you can have direct eye-contact with every student and improve the engagement level as a result...*

[Jeremy Bailenson](#) explains gaze and Virtual Reality.

## SimWorkshops: SUMMIT-TATRC Workshop Series

370 people attended one or more of the 9 workshops offered between January, 2005 and February, 2007. Workshops held in conjunction with other conferences drew the largest attendance. The online workshop encouraged global attendance. 74% of attendees said they made one or more new contacts or collaborations as a result of the workshops. Participants indicated that their knowledge of this field increased as a result of this series.



Now that the workshop series is over, we invite you to continue collaborating, learning, and engaging with this lively field of gaming and medical education.

Here's what you'll find on the site!

- [Get an overview](#) - The workshop listing includes the event announcement, the agenda with presentations and bios, the evaluation, and an attendee map.
- [Contribute a reading](#) - The presenters and SUMMIT staff have put together a list of articles and websites. Please send us your suggestions.
- [Download a video on games & engagement](#) - Two of the workshops were captured in video so you can attend anytime, anywhere.
- [Learn in detail about a topic](#) - All of the presentations are listed in the chronological index of all the workshops. Transcripts have been added for most of the presentations.

Figure 2. The home page for Simworkshops. During the project, the home page presented an overview of the next workshop. After project completion, the home page provides information about the vast range of content available on the site. Specifically, the About menu goes to project information; the Workshops menu gives access to each of the eight workshops, their slides, transcripts and videos, and the biographies of the speakers; the Readings menu accesses an organized reading list; and the Index menu is a list of all the

talks presented. An Attendee map was developed for the workshops, and a summary map is presented on this Home page.

## **Workshop Programs and Speakers:**

### **Workshop 1: 1/25/05**

#### **Gaming & Simulation Based Learning: Applications in Medicine**

Goal: Introduction of concepts and examples for S-b-L.

[http://simworkshops.stanford.edu/05\\_0125/1\\_25.html](http://simworkshops.stanford.edu/05_0125/1_25.html)

Greg Mogel & Carla Pugh LeRoy Heinrichs, Parvati Dev	TATRC-West's Goals for the SBL project Visions for the Future of Simulation Based Learning
Michael Zyda, USC	Perspectives on Gaming for Learning- America's Army
Noah Falstein, Inspiracy Inc.	Are we having fun yet? Designing a hit game
Craig Brannon, Legacy Interactive William Swartout, USC Kay Howell, The Learning Federation	Design of Real Life Games Games for Military Combat Training Research Roadmap for Simulation in Learning
Ben Sawyer, Digital-Mill, Inc. Panelists Panelists Panelists James Rosser	Games for Health Game Design Game Environments Business Models Games and Surgical Skills

### **Workshop 2: 6/14/05**

#### **Medical Surgical Education with Video Games**

Goal: Extending the concept of Games and S-b-L to surgical training:

[http://simworkshops.stanford.edu/Second\\_workshop.html](http://simworkshops.stanford.edu/Second_workshop.html)

Parvati Dev	Overview, Games & Simulations- The Current Reality
LeRoy Heinrichs	Surgical Simulations as Games- Games as Preparation for Surgery
Pat Youngblood	Framework for Evaluation a Surgical Simulator or a 3D Virtual World

### **Workshop 3: 10/7-10/8/05**

#### **Designing Compelling Medical Games**

Goal: Examining the different gaming platforms, the methods of procedure for game design and development.

[http://simworkshops.stanford.edu/Third\\_workshop.html](http://simworkshops.stanford.edu/Third_workshop.html)

LeRoy Heinrichs Bryan Bergeron, Harvard	State of the Art Game Design for Knowledge, Skills & Attitude Transfer
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Byron Reeves, Stanford	Game Design for Engagement
Pauline Brutlag, Stanford	Game Genres-with Demonstrations
Bryan Bergeron, Harvard	Authoring Tools for Game Design
Chris Darken, Naval Postgrad School	Beyond America's Army- New Directions
Matt Kaufman, Forterra	Designing MORPGs (Multiplayer Online Role Playing Games)
Pat Youngblood	Testing Games that Teach
Sowmya Ramachandran, Stottler-Hencke	Artificial Intelligence
Walter Greenleaf, Greenleaf Medical	Applications in Rehabilitation Medicine

#### **Workshop 4: 12/14-5/07**

##### **SUMMIT/TATRC Internal Workshop: Progress Assessment**

Goal: To review the workshops of the past year and to assess progress towards research goals

[http://simworkshops.stanford.edu/san\\_diego\\_workshop.html](http://simworkshops.stanford.edu/san_diego_workshop.html)

Parvati Dev	Welcome & Overview
Carla Pugh, TATRC	Review of SUMMIT-TATRC Goals
Pat Youngblood	Evaluation of Workshops: Summary
Group Leaders	Analysis of January, June & October Workshops
Pauline Brutlag, Stanford	Design a Game: Session 1
Group Leaders	Group Presentations
Parvati Dev, LeRoy Heinrichs	Future Directions of a Framework for Research on Game-based Learning
LeRoy Heinrichs	Brainstorming of Research Projects
Pauline Brutlag	Design a Game: Session 2
Group Leaders	Group Presentations

#### **Workshop 5: 1/23/06**

##### **Creating Games & Simulation for Learning**

Goal: Comparing games and simulations; and understanding funding options

[http://simworkshops.stanford.edu/Fifth\\_workshop.html](http://simworkshops.stanford.edu/Fifth_workshop.html)

Carla Pugh & Harvey Magee, TATRC	TATRC Update
Joe Henderson, Dartmouth Univ.	Creating a Compelling Game
Noah Falstein, The Inspiracy	Deconstruction of a Game
Anders Larsson, Surgical Sciences	Deconstruction of a Simulator
Fred Kron, Univ. of Wisconsin	Medicine and Technology
Grace Huang, Harvard	From Virtual Reality to Realty: What next?
Laura Kusumoto & LeRoy Heinrichs	Massively, Multi-player, Online, Simulation MMOS
Harvey Magee, TATRC	Funding
David Shorrock, Forterra	Government Funding Initiatives and how to use them

#### **Workshop 6: 8/24-8/25/06**

##### **Designing Case-based Learning for Virtual Worlds**

Goal: Creating on line learning using the power of multiplayer games

[http://simworkshops.stanford.edu/Sixth\\_workshop.html](http://simworkshops.stanford.edu/Sixth_workshop.html)

Jeremy Bailenson, Stanford	Learning & Teaching among Virtual Humans
Pat Youngblood	Serious Games for Health
Pauline Brutlag, Stanford	Design Ideas from Commercial Online Role Playing Games
James Scarborough, Stanford	Windows into other Realities
Mike Korelenko, N. Ontario Sch. Med.	Half Life-2
Jeremy Kemp, Fielding Grad Univ.	Second Life
Laura Kusumoto, Forterra	OLIVE
LeRoy Heinrichs	Story Development for Modeling Virtual Patients
Parvati Dev	"Intelligent" characters in Virtual World
Lou Halamek, Stanford	Debriefing- After Action Review

### **Workshop 7: 8/28-8/30/06**

#### **Prototyping of Surgical Simulators using Open Source Simulation Software**

Goal: To bring together surgeons and developers for a detailed discussion of surgical simulation software, the needs and the issues.

[http://simworkshops.stanford.edu/Seventh\\_workshop.html](http://simworkshops.stanford.edu/Seventh_workshop.html)

SUMMIT team	Welcome & Workshop Goals
Raj Aggarwal, Imperial College	Managing Expectations
David Gaba, Stanford	Realism in Simulation in Healthcare
Anders Larsson, Surgical Sciences	Realism in Surgical Simulation
Mika Sinanan, Univ. of Washington	Haptics in Simulation
Pat Youngblood	Framework for Evaluating Simulators
Kevin Montgomery, Stanford	Spring Simulation Platform
Yoshihiro Kuroda, Kyoto University	Virtual Reality Aided Surgical Simulation (VRASS)
Chris Sewell, Stanford	Overview of CHAI and Using the Haptic Device
Jeremie Allard, Paul Neuman, CIMIT	SOFA Development of an Open Framework for Med Simulation
Cenk Cavsoglu, Case Western Reserve	GiPSi Development framework for Surgical Simulation
Laura Pierce, Stanford	3D Imaging at Stanford

### **Workshop 8: 10/18/06**

#### **Panel on Simulation & Game-based Learning in Medicine**

Goal: To bring together a global team of speakers and a global audience via Internet

[http://simworkshops.stanford.edu/06\\_1018/program.html](http://simworkshops.stanford.edu/06_1018/program.html)

Kay Howell, FAS	Simulation & Game Based Learning
Ross Horley, MedicVision	An Asian-Australian view of simulation
James McGee, Univ. of Pittsburgh	Case Based Learning with Virtual Patients
LeRoy Heinrichs & Pat Youngblood	Medical Teams in Virtual Worlds
Pamela Kato, The GameRx	Learning Games for Patients
Raj Aggarwal, Imperial College	Embedding Simulation into Curricula
Nabil Zary, Karolinska Institutet	Simulations for Assessment

Carla Pugh, North-Western Univ.  
Jeremy Bailenson, Stanford  
Parvati Dev

Next Generation Surgery Simulation  
Impact of Digital Avatars  
Wrap-up

## Results

The workshops were evaluated using three different assessment tools:

- Questionnaires distributed at the workshop, to attendees, asking for feedback about the quality of the workshop, (**Formative Evaluation**)
- Questionnaires distributed at the workshop, to attendees, asking for demographic information, about their knowledge of simulation and game-based learning, their familiarity with research in the field, and their own level of activity in the field. (**Research**)
- An Email survey, sent at the end of each project year, to all prior attendees, probing the impact of the workshops on their knowledge and activities. (**Impact Evaluation**)

### Formative Evaluation of the workshops

These results are extensive, and are available on the SimWorkshops web site, linked from each workshop. The questionnaire is attached in Appendix A.

### Research results

Our original research hypotheses were:

- 1) Researchers and educators who participate in regional workshops and receive the written reports will gain greater knowledge of simulation-based learning and of the research and development activities in the western region.
- 2) Professional networking among the researchers and educators at the workshops will generate increased collaborative projects and research in the western region.

We evaluated these hypotheses through questionnaires distributed to attendees at each workshop. The results are presented as summaries of our Year 1 and Year 2 investigations in Appendix B.

### Impact Evaluation

#### E-mail Surveys of all Attendees:

We designed and implemented an email survey to assess the impact of these workshops on the participants' knowledge, skills and productivity in this area. The brief survey was sent to all who attended the SUMMIT-TATRC workshops. The first survey was sent after the first five workshops to 200 participants (received 47 returns, a response rate of 24%). The second, identical, survey was sent after all eight workshops and a capstone session at MMVR 2007, to 166 participants (received 45 returns, a response rate of 27%). A summary of the results is presented in Appendix C.

## Discussion

The responses to our research questionnaires and to our impact survey email demonstrate a high level of interest and learning among the participants over the two years of the project. The tables on page 20, for example, show that self-reported increase in knowledge changes by 2 points (on a 10 point scale) over the course of a year. Hands-on experience and working with colleagues score highest as a preferred way to learn a new area. The SUMMIT/TATRC workshops were rated as the next best approach in our first survey, and as comparable to some of the new, well-regarded conferences that have been started recently (Games for Health, Serious Games).

Creating and delivering the eight workshops was an exhilarating learning experience. The feedback on workshop quality was excellent. Specific suggestions on further community development, and on the need for more how-to workshops, indicates that there is considerable scope for training and conference sessions in simulation and game-based learning. We have worked closely with the management of the MMVR conference to create a new track on game technology and game-based learning, and hope that the baton will be passed to the program management of MMVR. We will continue to remain involved in that conference.

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**Acknowledgments:** The superb management of the workshops was the work of Madhu Khanna, aided by Margaret Krebs and Mari Kieft. The technical support by Robert Cheng (computers), Kingsley Willis (webpages and videos) and Margaret Krebs (web pages), assured the success of Stanford workshops. The support of the Staff of Wallenberg Hall at Stanford enabled ready access and operations. James Westwood and Karen Morgan of the Aligned Management, Inc. organization and Lou Winant greatly facilitated the workshops at MMVR. We gratefully acknowledge the confidence and partial funding by TATRC.

## Key Research Accomplishments

### Workshops Held:

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# Reportable Outcomes

## Results

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## **References**

<http://summit.stanford.edu>

<http://simworkshops.stanford.edu>

# Appendices

## Appendix A

### Evaluation of Workshop Quality

#### Questionnaire

**SIM Workshop Evaluation  
January 25, 2005**

**Please give us your honest feedback to help us plan for our next workshop.**

1. What did you find most interesting about the workshop sessions you attended today?
2. What did you find difficult or unclear?
3. Did you feel actively involved in the sessions? Why or why not?
4. What have you learned that you think you can use in your work?
5. What follow up questions do you have?
6. What other feedback do you have for the workshop leaders?

**Thank you for your participation!**

#### Results

Results for each workshop are available on the SimWorkshops web site.

<http://simworkshops.stanford.edu/>